



San Jacinto River Waste Pits Superfund Site

April 16, 2014



Meeting Objective

- Demonstrate that Alternative 3N and Alternative 2S are the best choices for USEPA Region 6 to choose as recommended remedies for the San Jacinto River Waste Pits Superfund Site
 - Alternative 3N is protective and meets USEPA and USACE sediment capping guidance
 - Neither alternative would require exposure of underlying waste during construction or removal
 - These alternatives are consistent with NCP and USEPA remedy selection guidance

Outline

- Site Location, History, and Conditions
- Time Critical Removal Action (TCRA)
Construction, Monitoring and Maintenance
- Remedial Investigation (RI) Summary
- Array of Alternatives
- Evaluation of Alternatives
- Consistency with Policy and Guidance

Site Location and History



LEGEND

- Interstate 10
- Original (1966) Perimeter of the Impoundments North of I-10
- USEPA's Preliminary Site Perimeter
- Soil Investigation Area 4

NOTES:

1. Designation of the Upland Sand Separation Area is intended to be a general reference to areas in which such activities are believed to have taken place based on a review of aerial photography from 1998 through 2002.
2. Aerial Imagery: Copyright Microsoft Bing Maps, 2010.
3. Hog Island location source: Google Earth, 2011.

Summary of TCRA Objectives

TCRA Completed July 12, 2011

- Stabilize waste pits (100-year storm event)
- Prevent direct human contact
- Prevent benthic contact
- Consistent with long-term remediation strategies



Armored Cap Maintenance

- Maintenance issues are expected:
 - St. Paul Waterway Cap and Eagle Harbor Cap
 - Constructed in the late 1980s and early 1990s
 - Required maintenance in the first few years
 - St. Paul Waterway capping area delisted from NPL
 - Subsequent monitoring has demonstrated the continued protectiveness of these sediment caps
- Maintenance is provided for in the TCRA OMM Plan

July 2012 Armored Cap Maintenance

- Localized area of the armor layer along the “western berm”
- No exposure of underlying materials
- Maintenance included placing additional armor to flatten slopes to 5:1



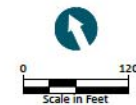
July 2012 Extent of Maintenance



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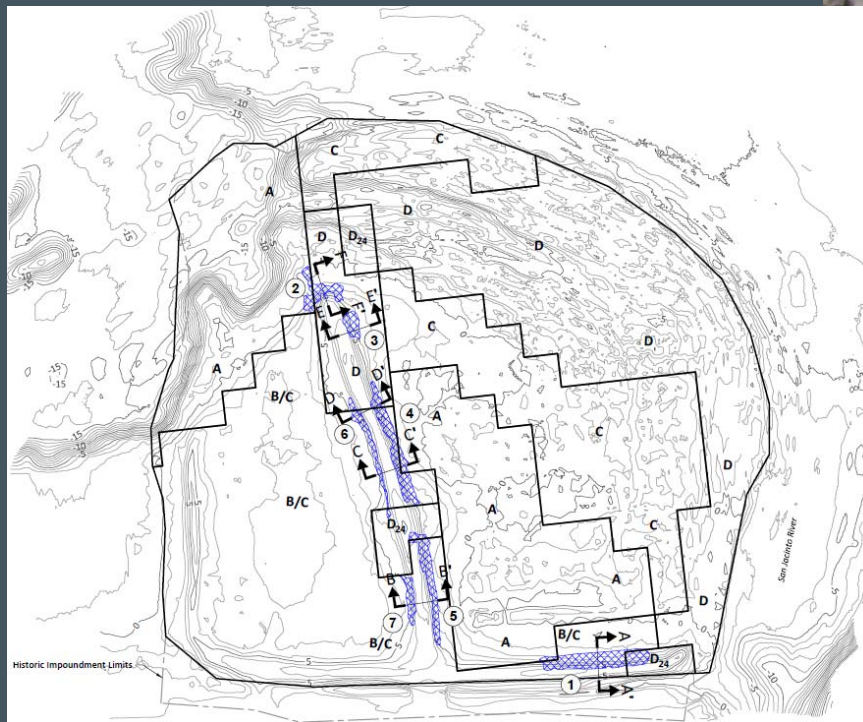
- Topographic Contours (1-foot interval)
- Armored Cap Limits
- Visible geotextile area - July 2012

HORIZONTAL DATUM: Texas South Central, NAD83, US Survey Feet.
VERTICAL DATUM: NAVD88.
SOURCE: Survey data shown provided by Hydrographic Surveys dated June 5, 2012 and July 24, 2012.



Armor Cap Permanency Enhancements

January 2014 - Completed
Armor Cap enhancements
per U.S. Army Corps review
and recommendations



All slopes now 3H:1V or less

The TCRA Armored Cap Provides Long-Term Protection

- Originally designed to withstand a 100 year flood and is capable of withstanding a 500 year flood event
- Exceeds U.S. Army Corps Capping Guidance and site-specific recommendations
- Since its completion in July 2011, the Armored Cap has been effective in isolating and containing the impacted material

Significant RI Conclusions

- Risk north of I-10 was limited to materials within the TCRA footprint
 - Direct exposure of clams and potential human receptors to surface materials within the northern impoundments
 - Exposure pathway removed by cap
- Risk to the south only associated with hypothetical future construction worker
 - Subsurface soils in three limited areas exceed the protective concentration level

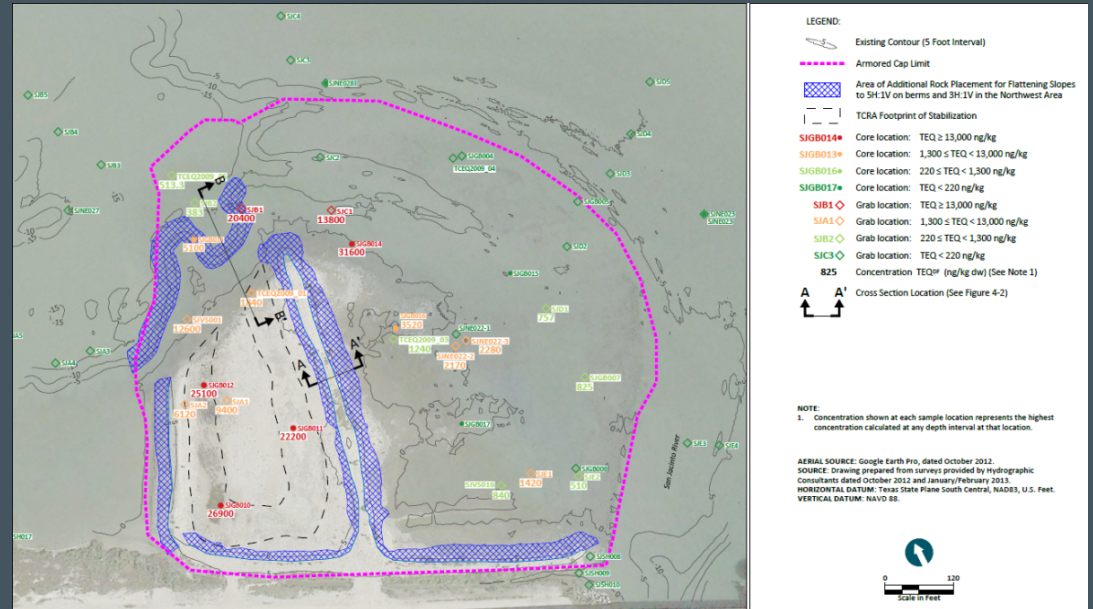
FS Alternatives – North of I-10

Alternatives North I-10	Actions	Cost (Millions)
Alternative 1N	<p>Armored Cap and No Further Action:</p> <ul style="list-style-type: none"> • Armored Cap would remain in place, fencing, warning signs • Long-term OMM 	\$ 9.5
Alternative 2N	<p>Armored Cap, Institutional Controls (ICs), and Monitored Natural Recovery (MNR):</p> <ul style="list-style-type: none"> • Includes Alternative 1N, • ICs in the form of deed restrictions and notices • Periodic monitoring to assess the natural recovery processes 	\$ 10.3

Alternative 3N – Permanent Cap, ICs, and MNR

Alternative 2N plus additional enhancements to the Armored Cap:

- Exceeds U.S. Army Corps standards
- Protective measures to prevent impacts from Vessels
- Approximately 2 months of construction
- \$12.5 MM



Alternatives 4N through 6N – Stabilization and Partial/Full Removal

- Alternative 4N - Partial S/S, Permanent Cap, ICs, and MNR (\$23.2 MM)
- Alternative 5N - Partial Removal, Permanent Cap, ICs, and MNR (\$38.1 MM)
- Alternative 5aN - Partial Removal of Materials Exceeding the PCL, Permanent Cap, ICs, and MNR (\$77 MM)
- Alternative 6N - Full Removal of Materials Exceeding the PCL, ICs, and MNR (\$99.2 MM)

Alternatives for Area South of I-10

- Alternative 1S – No Further Action
- Alternative 2S – Institutional Controls
- Alternative 3S – Enhanced Institutional Controls
- Alternative 4S – Removal and Off-site Disposal



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Peer Review by Steven Nadeau

Capping is Endorsed as an Accepted Remedy under the Sediment Guidance

- “It is important to remember that each of the three major approaches may be capable of reaching acceptable levels of both short-term effectiveness and long-term effectiveness and permanence, and that site-specific characteristics should be reviewed during the alternatives evaluation to ensure that the selected alternative will be effective in that environment.” (p. 3-15, 16)
- “Project managers should evaluate and compare the effectiveness of in-situ (capping and MNR) and ex-situ (dredging) alternatives under the conditions present at the site.” (p. 3-16)
- “There should not be necessarily a presumption that removal of contaminated sediments from a water body will be necessarily more effective or permanent than capping or MNR.” (p. 3-16)

Capping is a Proven, Effective and Protective

Highlight 5-1: Some Site Conditions Especially Conducive to In-Situ Capping

- Suitable types and quantities of cap material are readily available
- Anticipated infrastructure needs (e.g., piers, pilings, buried cables) are compatible with cap
- Water depth is adequate to accommodate cap with anticipated uses (e.g., navigation, flood control)
- Incidence of cap-disrupting human behavior, such as large boat anchoring, is low or controllable
- Long-term risk reduction outweighs habitat disruption, and/or habitat improvements are provided by the cap
- Hydrodynamic conditions (e.g., floods, ice scour) are not likely to compromise cap or can be accommodated in design
- Rates of ground water flow in cap area are low and not likely to create unacceptable contaminant releases
- Sediment has sufficient strength to support cap (e.g., higher density/lower water content, depending on placement method)
- Contaminants have low rates of flux through cap
- Contamination covers contiguous areas (e.g., to simplify capping)

Highlight from USEPA Sediment Management Guidance, 2005

Comprehensive National Survey Did Not Reveal any Engineered Caps That Were Removed

- Question posed: Aware of any engineered caps that were REMOVED after construction?
- Answer: NONE
- EPA HQ
- Dr. Danny Reible (international capping expert)
- SMWG Survey (40 Members; 66 Sponsors)
- One contractor has capped over 1000 acres and not a single sq. ft. has ever been removed

Dredging effectiveness has limitations

- Dredging, just like any sediment remedy, is not perfect
- EPA Sediment Guidance (2005) clearly describes dredging's limitations and urges consideration of those factors to site-specific conditions
- "Some contaminant release and transport during dredging is inevitable and should be factored into the alternatives evaluation and planned for in the remedy design." (Sec. 6.5.5)

Dredging Risk of Remedy Implementation-Resuspension and Releases

- “To compare various remedies for a site, to the extent possible, the project manager should attempt to estimate the downstream mass transport and the degree (if any) in downstream surface water and surface sediment contaminant concentrations.” (Sec. 6.5.5)
- “Project managers should factor a realistic estimate of dredging residuals into their evaluation of alternatives.” (Sec. 6.5.7)

Dredging Risks and Reduced Effectiveness

ERDC/EL TR-08-4



**US Army Corps
of Engineers®**
Engineer Research and
Development Center

Dredging Operations and Environmental Research Program

The Four Rs of Environmental Dredging: Resuspension, Release, Residual, and Risk

Todd S. Bridges, Stephen Ells, Donald Hayes, David Mount,
Steven C. Nadeau, Michael R. Palermo, Clay Patmont, and
Paul Schroeder

January 2008

Sediment Guidance- Comparative Net Risk (Section 7.4)

- “Project managers are encouraged to use the concept of comparing net risk reduction between alternatives as part of their decision-making process for contaminated sediment sites, within the overall framework of the NCP remedy selection criteria.” (p. 7-13)
- This is based on the National Academy of Science (NAS) 2001 Report on Remediation of Contaminated Sediments

NCP Criteria

- Overall Protection of Human Health and the Environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Long-Term Effectiveness
- Reduction of Toxicity, Mobility and Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- Modifying Criteria – State and Community Acceptance

Alternative 3N

- High short and long-term effectiveness
- Armored cap would be enhanced for reliability (high long-term effectiveness)
- No cap removal resuspension of sediment (low short-term hazards of implementation)
- Same technology as used for implementing TCRA (no implementability issues)
- As anticipated, fully incorporates TCRA into the final remedy, consistent with Guidance

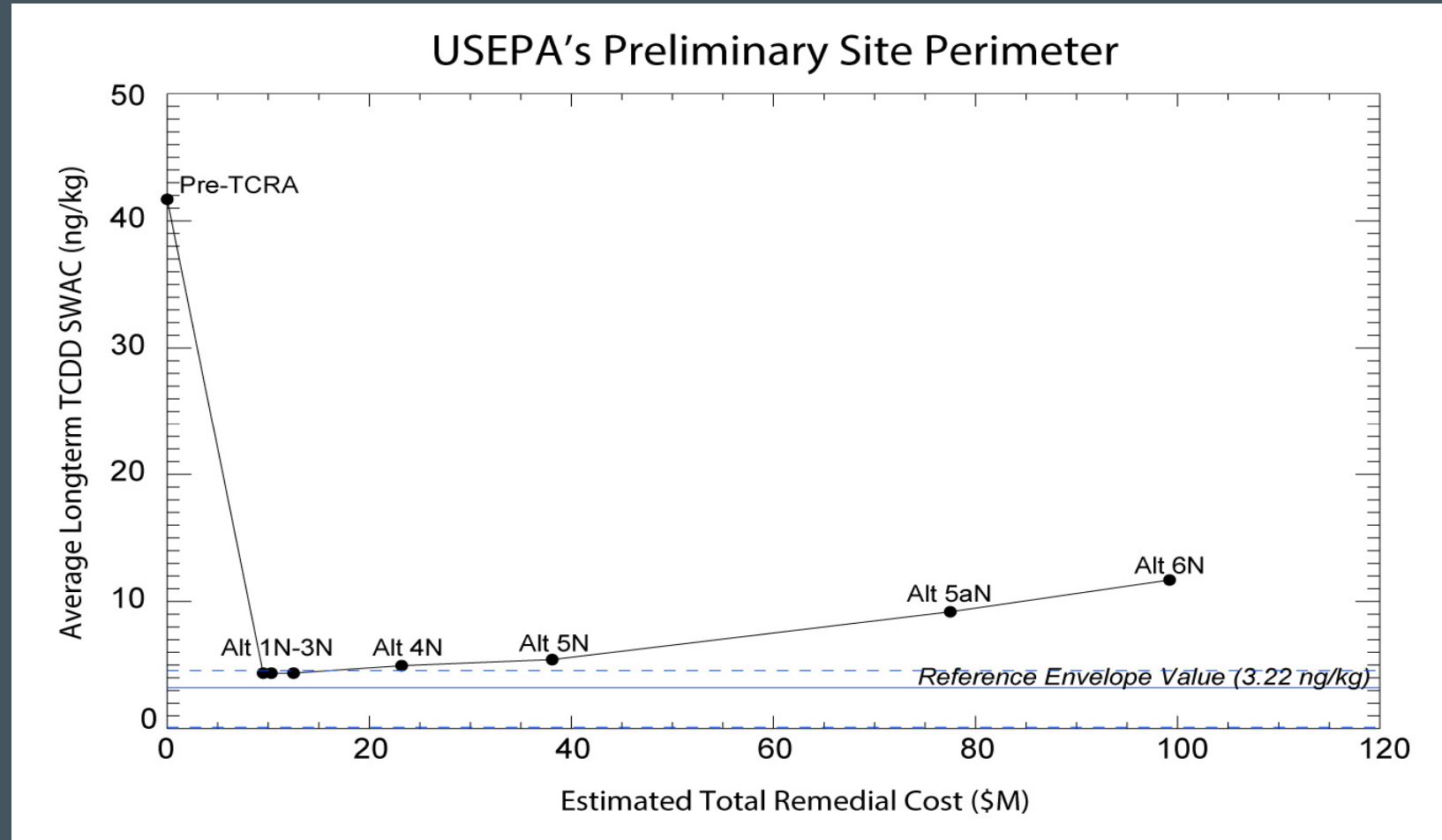
Alternative 4N-6N are not as effective and do not rank nearly as highly as 3N

- Alternatives 4N-6N have less short-term and long-term effectiveness
- Virtual certainty that some dioxin would be resuspended and released downstream during cap removal under normal site conditions and even greater risk would occur in a storm event during the lengthy remedy construction
 - 23% (4N) to 100% of the Armored Cap (5N to 6N) would be removed
 - Construction period ranging from 13 to 19 months

The NCP and Sediment Guidance Require Remedies to be Cost-Effective

- “Each remedial action selected shall be cost-effective” (40 CFR §300.430(f)(1)(ii)(D)).
- Cost-effectiveness is defined as when “costs are proportional to its overall effectiveness.” (40 CFR §300.430(f)(1)(ii)(D)).
 - “...if the difference in effectiveness is small but the difference in cost is very large, a proportional relationship between the alternatives does not exist.” (Preamble to NCP) (55 Fed Reg. 8728 (3/8/90))
- These proportionality requirements were reiterated by U.S. EPA in the Sediment Guidance: Regions must select remedies that are cost-effective (p. 7-17) and should “compare and contrast the cost and benefits of various remedies.” (p. 7-1)

Evaluation of Incremental Protectiveness versus Incremental Costs



The Sediment Guidance Strongly Encourages Use of Risk Management

- “Sediment Management Principle states: “Select Site-Specific, Project-Specific and Sediment-Specific Risk Management Approaches that will Achieve Risk-based Goals.”
- Consider the advantages and limitations of available approaches and a balancing of tradeoffs among alternatives.
- Select a remedy design to reduce key human and ecological risks effectively.
- Compare and contrast the cost and benefits of various remedies.

EPA Policy Strongly Encourages Selecting Early Actions Consistent with the Final Remedy

- CERCLA 104(a)(2) Removal Action- Any removal action to the greatest extent practicable should contribute to the efficient performance of any long term remedial action with respect to the release or threatened release concerned
- NCP 300.430(a)(ii)(B) provides “Operable units, including interim action operable units, should not be inconsistent with nor preclude implementation of the expected final remedy.”

Alternative 3N Will Result in the Optimal Remedy for the Area North of I-10

- Is fully consistent with CERCLA, the NCP, Sediment Management Guidance, and USACE Capping Guidance
- Incorporates and enhances the TCRA armored cap and assures protectiveness under any flow conditions
- Meets the cost-effectiveness/proportionality requirements of the NCP
- Will enhance the effectiveness and long-term protectiveness of the existing armored cap
- In contrast, site-specific conditions and the construction risks inherent in dredging risks reduce the potential effectiveness of removal options 4N-6N

Alternative 2S Will Result in the Optimal Remedy of the Site for the Area South of I-10

- No existing exposure pathway
- Institutional controls will provide an appropriate level of protection and long-term effectiveness
- Does not require impacts to existing structures and avoids disruption to existing businesses

Preferred Remedies

- Alternatives 3N and 2S distinguish themselves as the most consistent with the key principles of the NCP and the Sediment Guidance

Path Forward/Discussion